

REMARKS

Claims 1, 3-11, 13-19, and 21-33 are pending in this application. Claim 1 has been amended. New Claims 26-33 have been added. Support for the new claims is found in the specification and claims as filed.

Claim Rejections - 35 U.S.C. § 103(a) – Chau in view of Miller

Claims 1, 3, 4, 13-19, and 21-25 have been rejected under 35 U.S.C. §103(a) as obvious over U.S. Patent No. 4,873,037 (hereinafter “Chau”) in view of U.S. Patent No. 4,906,371 (hereinafter “Miller”).

Pending independent Claim 1 as amended recites a filter laminate comprising, inter alia, “a first membrane layer comprising a first membrane, wherein said first membrane is a microporous or ultraporous asymmetric membrane, said first membrane having a first surface and a second surface, each of said surfaces comprising pores, and a support region between said first surface and said second surface, said first membrane comprising an asymmetric region comprising flow channels that gradually increase or decrease in diameter from a point in said support region to said second surface; at least a second membrane layer comprising a second porous membrane; and a bonding layer, wherein said bonding layer comprises a hot melt adhesive heat-bonded to said first membrane layer and to said second membrane layer, and further wherein the filter laminate has a flow rate therethrough such that the filter laminate is configured for separation by filtration.”

Pending independent Claim 19 recites a filter laminate comprising, inter alia, “a first distinct preformed layer of material, said first distinct preformed layer comprising a first membrane layer, said first membrane layer comprising a microporous or ultraporous asymmetric membrane, said microporous or ultraporous asymmetric membrane having a first surface and a second surface, each of said surfaces comprising pores, and a support region between said first surface and said second surface, said first membrane comprising an asymmetric region comprising flow channels that gradually increase or decrease in diameter from a point in said support region to said second surface; a second distinct preformed layer of material, said second distinct preformed layer comprising a second porous membrane layer; and a third distinct preformed layer of material, said third distinct preformed layer comprising a third membrane layer; wherein each layer is adjacent to at least one other layer, wherein adjacent layers are

secured by a bond, and wherein the bond is formed by a hot melt adhesive heat-bonded to said adjacent layers, and further wherein the filter laminate has a flow rate therethrough such that the filter laminate is configured for separation by filtration.”

Claims 1, 3, 4, and 13-18, and 23

To articulate a prima facie case of obviousness under 35 U.S.C. §103(a), the PTO must, inter alia, cite prior art that teaches or suggests all the claimed limitations. In re Royka, 490 F.2d 981 (C.C.P.A. 1974). Membranes having “an asymmetric region comprising flow channels that gradually increase or decrease in diameter” as recited in Claim 1 are neither taught nor suggested by Chau and Miller. Accordingly, a prima facie case of obviousness cannot be established and Applicants respectfully request withdrawal of the rejection of Claim 1 and its corresponding dependent claims.

Claims 1, 3, 4, and 13-19, 23, and 24

As acknowledged in the Office Action, Chau does not disclose laminates comprising hot melt adhesives. The Office Action proposes to combine the teachings of Miller with those of Chau. However, this cannot yield the invention as presently claimed in Claims 1 and 19. Miller discloses a filter element incorporating a microporous membrane having an elongated porous filtration area bordered by substantially non-porous sealing areas of non-porous tape heat sealed to the membrane (see col. 12, ll. 3-6). The tape is a polymeric tape which is non-porous (emphasis added, see col. 12, ll. 55-59), and thus has no flow rate therethrough. Accordingly, in Miller, the membrane has two distinct types of regions: 1) filtration areas comprising layers that are adjacent to each other but not bonded to each other (areas that are configured for separation by filtration, but which are not filter laminates); and 2) non-porous regions where layers are bonded to each other by a non-porous heat sealable tape (laminated areas not configured for separation by filtration). The use of a non-porous sealing (bonding) layer is critical in the filters of Miller, and Miller distinguishes his sealing methods from those of the prior art based on this non-porous sealing layer: “in most of the prior art uncovered by applicant relating to sealing filters, the filter media sealing area is porous, so that when a thermoplastic or sealing surface is applied thereto it flows through the porous media to effect the seal.” See col. 7, ll. 24-28.

Using the non-porous sealing tape of Miller to bond together two membrane layers across their entire surface area would yield a laminate unsuitable for use as a filtration media because no

liquid could pass through it. Likewise, if only an outer sealing portion of two membrane layers were laminated, and not the remaining portion used for filtration, the filtration portions would not be laminated and the full benefits of lamination as described in Applicants' specification as filed would not be achieved (see page 11, ll. 17-19). "If the membranes are not laminated together, there is a chance that they can separate during packaging into cartridges, during filtration, and/or during integrity testing."). Accordingly, there is no suggestion or motivation to modify Chau with Miller to yield the invention of Claim 1 or Claim 19 or their corresponding dependent claims, and Applicants respectfully request withdrawal of the pending rejection.

Further, regarding Claim 22, Applicants respectfully disagree that the shape of the hot melt adhesive before use is not important. The hot melt adhesive recited in the claim becomes a viscous liquid when subjected to a temperature characteristic of a lamination process. Because of this viscosity, it does not flow rapidly, but instead softens while retaining its shape. A solid sheet of hot melt adhesive, as in Miller, will remain a solid sheet upon heating and application of pressure in a lamination process – it will not have a flow rate therethrough, rendering the filter laminate unsuitable for separation by filtration. In contrast, porous materials such as a nonwoven fibrous material, a woven fibrous material, or an open extruded material, upon heating and application of pressure in a lamination process will maintain at least some of the porosity of the original form – because of this porosity, the filter laminate will have a flow rate therethrough, and thus be configured for separation by filtration. Miller et al does not teach the use of porous hot melt adhesives, but instead teaches away from this form, specifically stating that the tape is non-porous (col. 12, ll. 55-59). A *prima facie* case of obviousness cannot be established if the disclosure of the cited prior art, when taken as a whole, teaches away from the claimed invention. See, e.g., M.P.E.P. § 2141.02. Accordingly, Applicants respectfully reiterate their request withdrawal of the pending rejection.

Further, regarding Claims 23-25, while Chau discloses a permeable filter laminate, the laminated areas in Miller are non-porous (as discussed above), and thus impermeable to water. Miller teaches away from non-porous hot melt adhesives. A *prima facie* case of obviousness cannot be established if the disclosure of the cited prior art, when taken as a whole, teaches away from the claimed invention. Moreover, modifying Chau by using the non-porous hot melt adhesive would render the Chau laminate unsuitable for use as a filter, because the resulting

Chau laminate would be non-porous. If the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). See, e.g., M.P.E.P. § 2141.02. Accordingly, Applicants respectfully reiterate their request withdrawal of the pending rejection.

Claims 21 and 25

To articulate a *prima facie* case of obviousness under 35 U.S.C. §103(a), the PTO must, *inter alia*, cite prior art that teaches or suggests all the claimed limitations. In re Royka, 490 F.2d 981 (C.C.P.A. 1974). Chau and Miller in combination do not teach or suggest all of the limitations of pending Claim 21 and its dependent Claim 25. Pending independent Claim 21 recites a filter laminate comprising, *inter alia*, “a first membrane layer comprising a first membrane, wherein said first membrane is an asymmetric membrane having a skin surface and an open surface, wherein pores of the open surface are larger than pores of the skin surface; a second membrane layer comprising a second membrane, wherein said second membrane is an asymmetric membrane having a skin surface and an open surface, wherein pores of the open surface are larger than pores of the skin surface; and a bond between each of said adjacent layers, wherein said bond is between the skin surface of the first membrane and the skin surface of the second membrane, wherein the filter laminate has a higher bubble point than either the first membrane or the second membrane, and wherein the filter laminate has a greater integrity than a combination wherein the skin surface of the first membrane and the skin surface of the second membrane are adjacent to each other but not bonded to each other, wherein the filter laminate has a flow rate therethrough such that the filter laminate is configured for separation by filtration.”

Neither Chau nor Miller teaches or suggests a laminate comprising two asymmetric membranes in a skin-to-skin bonded configuration, as recited in the claim. As discussed in the application as filed at page 10, ll. 11-21, a skin-to-skin configuration dramatically increases the bubble point of the resulting filter laminate above that of either of the single layers, due to the fact that the probability of lining up two large pores (which are responsible for the bubble point) is significantly reduced because most of the pores are “average” size, and probability greatly favors the situation where a large pore is confronted by numerous smaller pores. This results in greatly improved membrane integrity and, therefore, improved bacterial and particle retention.

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Simply placing two asymmetric membranes together, skin-to-skin, without bonding them, may not reduce the bubble point because the test air that flows through the top layer can travel laterally until it finds a larger pore in the bottom layer.

Accordingly, a *prima facie* case of obviousness cannot be established and Applicants respectfully request the rejection of Claim 21 and its dependent Claim 25 be withdrawn.

Claim Rejection - 35 U.S.C. §103(a) - Chau in view of Miller and Dennison

Claims 5-11 have been rejected under 35 U.S.C. §103(a) as obvious over Chau in view of Miller and further in view of US 5,006,247 ("Dennison").

As discussed above, the proposed modification of Chau using the Miller non-porous hot melt adhesive results in a laminate that is non-porous, and thus does not a flow rate therethrough, making it unsuitable for separation by filtration. Dennison is cited as disclosing microporous or ultraporous asymmetric membranes. Even if such membranes were employed in the laminate of Chau in view of Miller, the laminate would still be non-porous, and thus would not have a flow rate therethrough, making it unsuitable for separation by filtration. Moreover, membranes are not randomly interchangeable – their compositions, morphologies, and flow characteristics must all be carefully considered in view of the use to which they will be put. The Chau laminates are used for gas and liquid separations, and not for microfiltration or ultrafiltration (i.e., filtration of solid particles from a liquid). If the asymmetric layer of Dennison (or the asymmetric membrane of Miller) were substituted for the separation layer of Chau, then the Chau membrane system would no longer be capable of use in gas and liquid separations. Likewise, substituting the Chau membrane for a microfiltration or ultrafiltration membrane would yield a membrane unsuitable for use in filtering solid particles from a liquid. If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

Moreover, if the asymmetric layer of Dennison were substituted for the support layer of Chau, then the benefits of the Chau support would be lost, i.e., a narrow pore size distribution coupled with a small pore size. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In *re* Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

To articulate a *prima facie* case of obviousness under 35 U.S.C. §103(a), the PTO must, inter alia, cite prior art that teaches or suggests all the claimed limitations. As discussed above, neither Chau nor Miller teaches a membrane possessing "an asymmetric region comprising flow channels that gradually increase or decrease in diameter", a limitation of Claim 1 from which Claims 5-11 depend. The membranes of Dennison also do not possess "an asymmetric region comprising flow channels that gradually increase or decrease in diameter". The cross-sectional figures of Dennison *et al.* show hollow tube-like structures of relatively constant diameter, with abrupt transitions to hollow tube-like structures with larger or smaller diameters, not a gradual increase or decrease in diameter. Accordingly, a *prima facie* case of obviousness cannot be established and Applicants respectfully request withdrawal of the rejection of Claims 5-11.

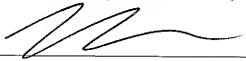
Conclusion

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns that might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number below.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

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By: 
Rose M. Thiessen
Registration No. 40,202
Attorney of Record
Customer No. 20,995
(619) 235-8550